

# ECS Talk: Digital Memory Manager: Database and Filesystem Directions

June 11, 2002

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Chief Technical Officer,  
Business Platforms**

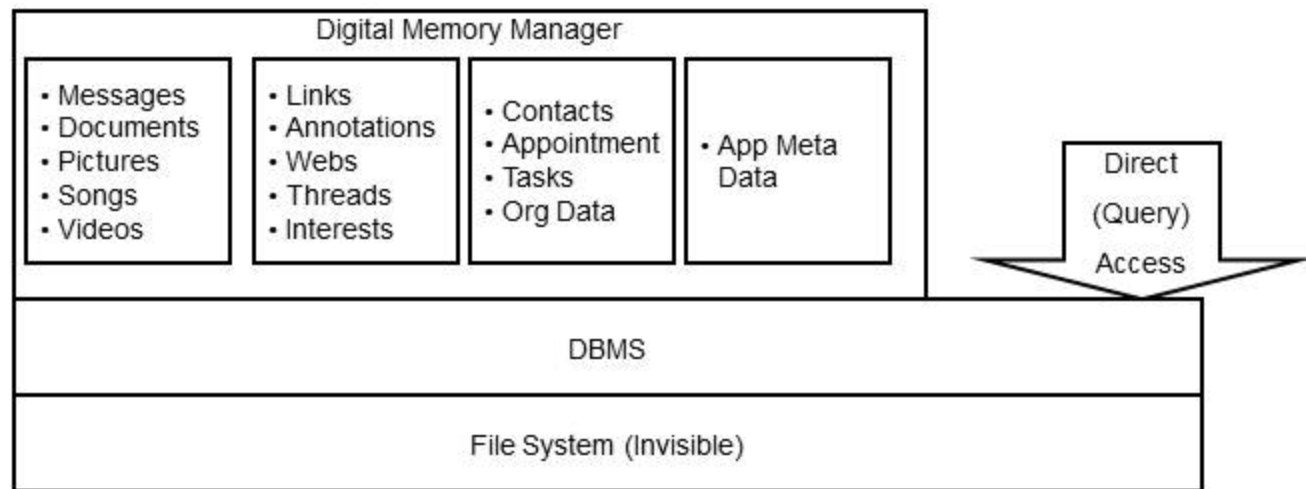
The Digital Memory Manager  
Reality & Dreams

The Digital Memory Manager

Pragmatism and Dreams

A Plan for The Store We Really  
Need

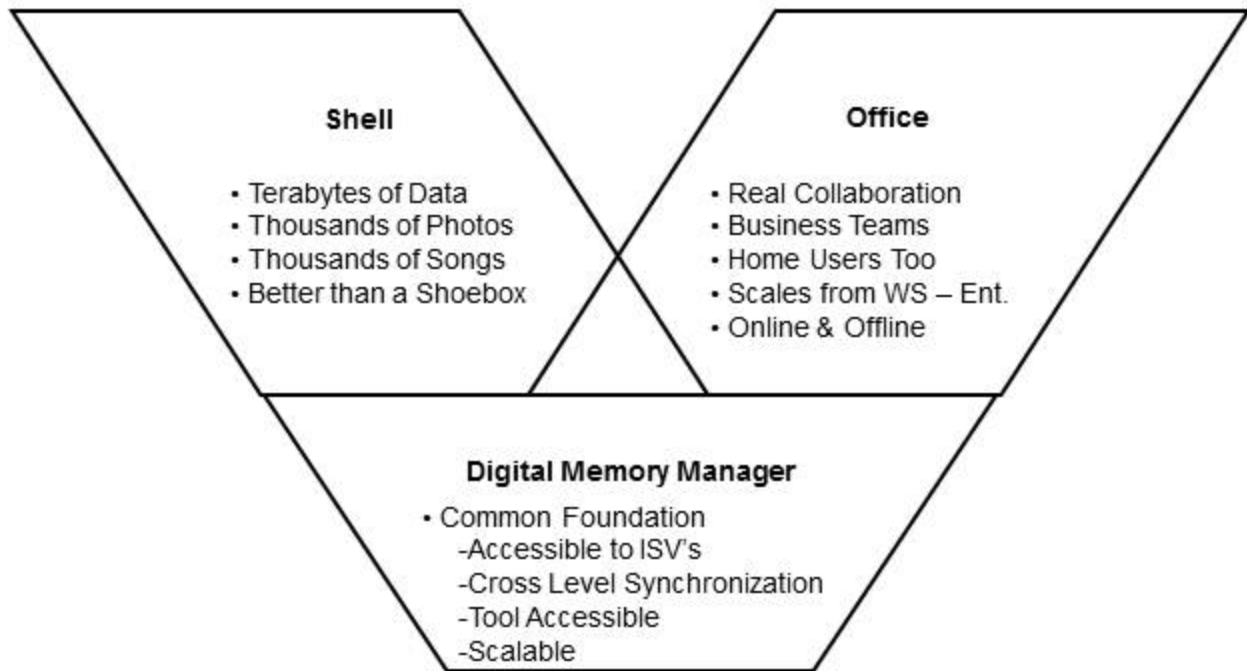
# The Digital Memory Manager: More Than A Layer



- Yes, A Store
- No, Not a Database
  - Uses Database Directly and Naturally
  - Heavily Schema Based

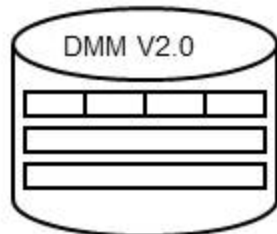
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# Why Would Anybody Want It?



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# Walk, Then Run . . .



Longhorn	BlackComb
<ul style="list-style-type: none"><li>• Special "App" Level Store<ul style="list-style-type: none"><li>- New API's Only</li><li>- Stores Collections &amp; People</li><li>- Exists only as an app "layer"</li><li>- Used by Shell &amp; Office</li></ul></li><li>• STS facilities (Threads, etc)</li><li>• Primarily People</li></ul>	<ul style="list-style-type: none"><li>• Full File System Replacement<ul style="list-style-type: none"><li>- Complete W32FS API</li><li>- Store Exes</li><li>- Kernel Mode Enhancements</li><li>- Used by All Apps</li></ul></li><li>• Rich Collaboration</li><li>• Complete People, Places, Time</li><li>• Registry Replacement</li><li>• Application Meta Data Storage</li><li>• Versioning and Branching</li><li>• New Formats for Sound, Pics</li><li>• New Indexing (Faces, etc)</li><li>• Rich DRM, Distribution Engine</li></ul>

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# Why Have We Failed?

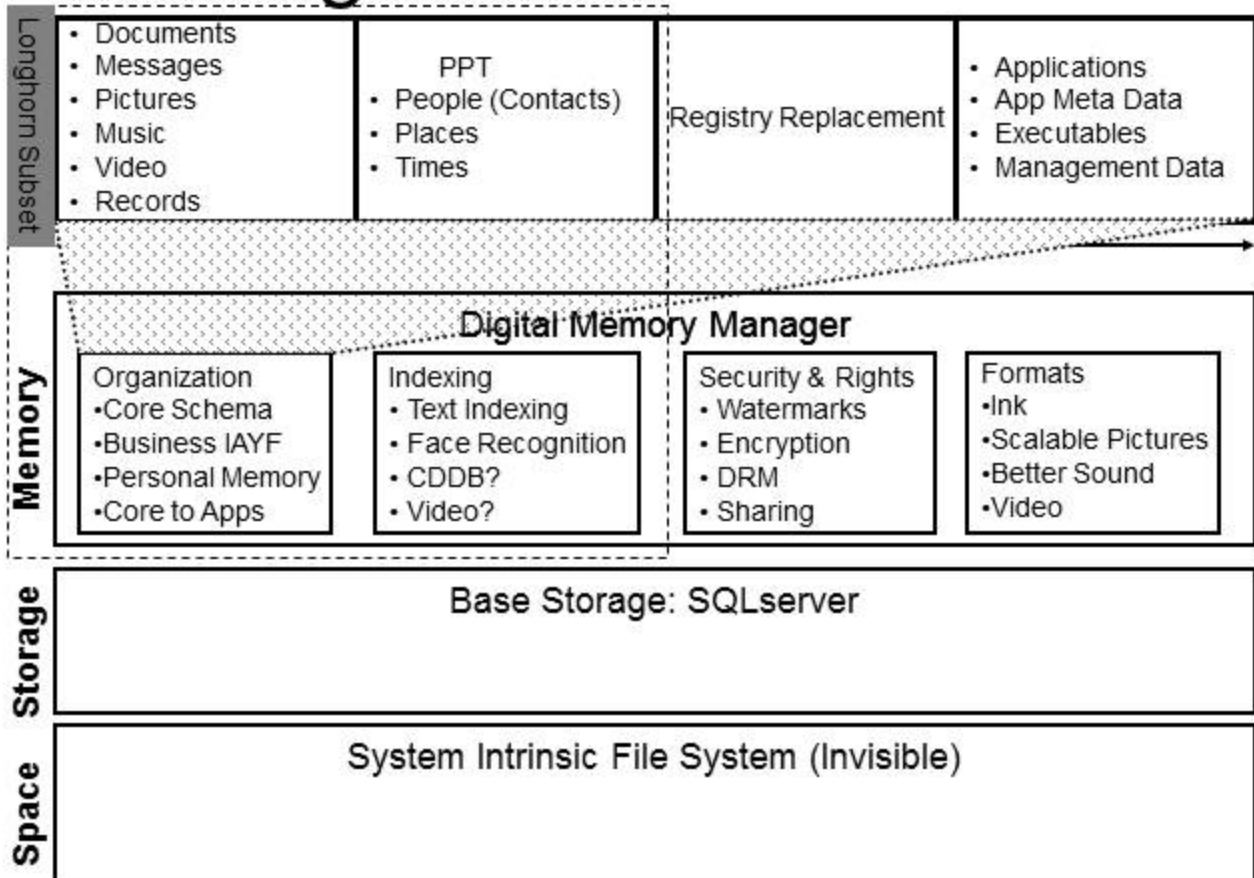
## And Can We Succeed Now?

- Unwillingness to make hard decisions
- Wrong architecture from the beginning
- Core parts of the design wrong each time
- Unwillingness to make big bets
- Trying to do it all in one step – too big, too long, too hard
- Not recognizing the “build parts before systems” problem
- Only planning one release at a time

# But Isn't Another Layer Bad?

- **SQLserver and Exchange are both “layers”**
- **All database servers, all applications servers, all collaboration servers are layers**
- **Successful file systems have been built as layers**
- **All slide managers, asset managers, document managers are layers**
- **Historically network operating systems (NOS's) were basically a form of -- primarily storage – layer**
- **This is a big and important piece, worth being an engine in it's own right**
  - **It is a form of document manager**
  - **Document managers have always been engines (built on db's)**
  - **Eventually it will be the most heavily used store in the world**

# Once Again: What Is the DMM?



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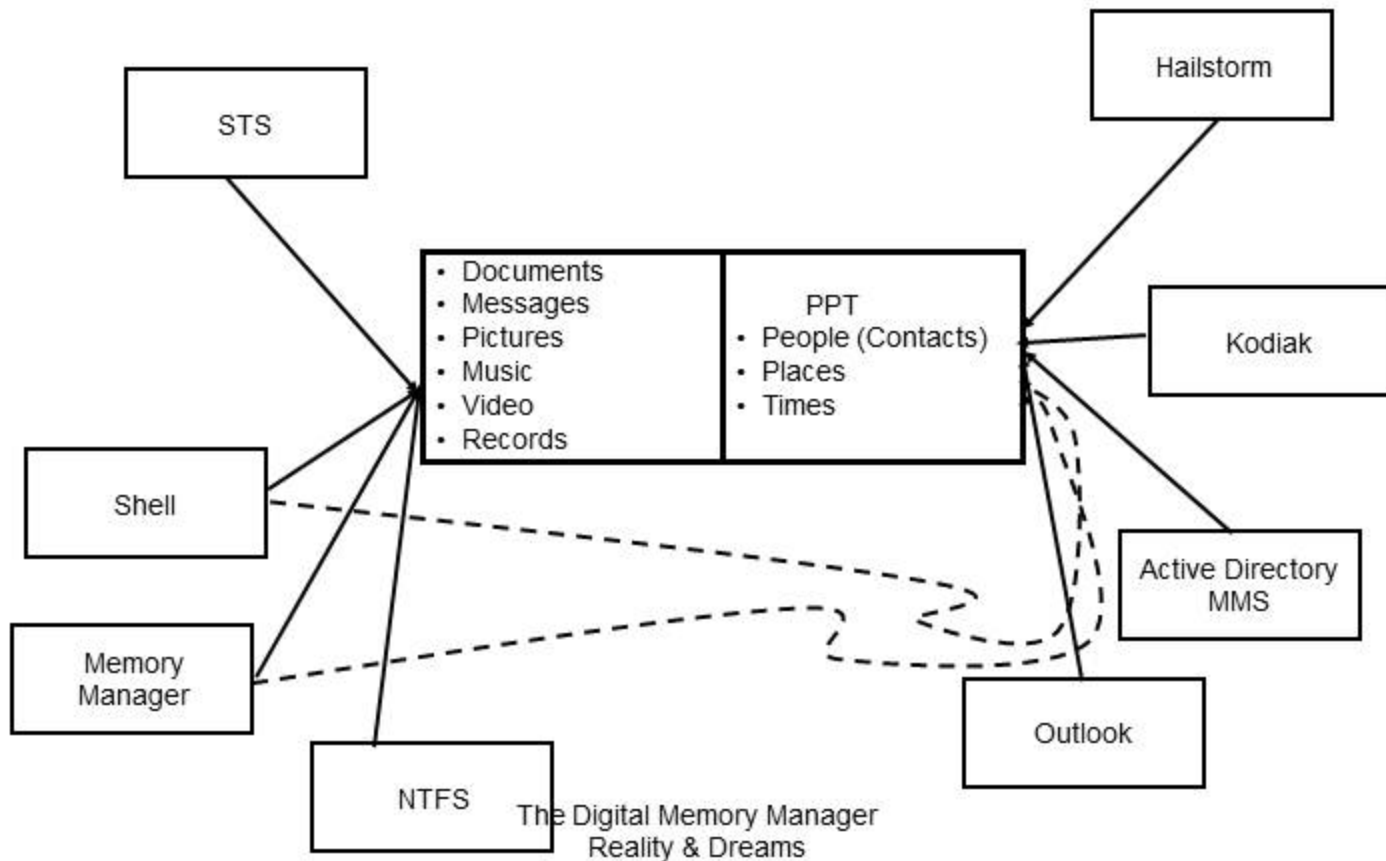


# How Many **\_\_** Do We Need?

	File System	Directory	Calendar	PIM
Hailstorm		Y	Y	
STS	Y		Y	Y
Digital Memory Manager	Y	Y	Y	
Shell		Y ?		Y
Outlook		Y	Y	Y
Kodiak		Y	Y	
AD / MMS		Y		
NTFS	Y			

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# Pieces and Conflicts: Two Core Areas

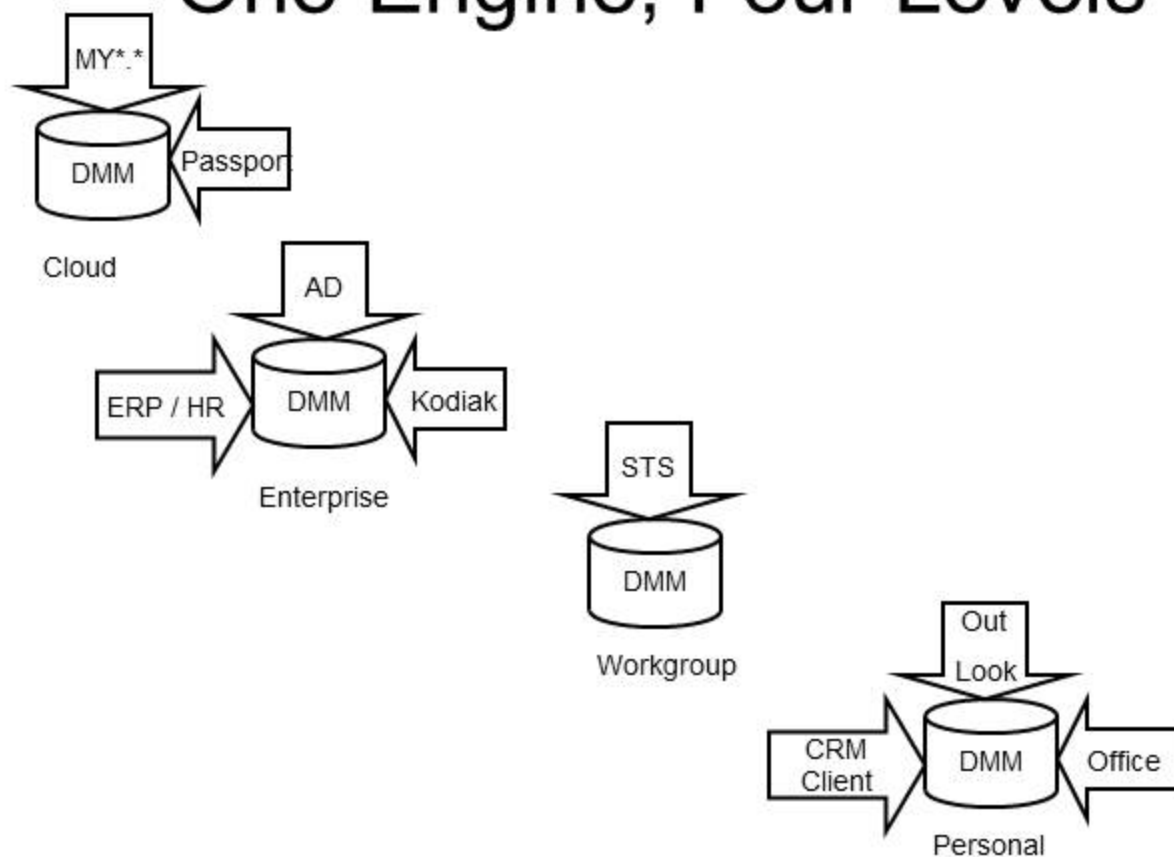


# Four Levels (And a Fifth . . .)

Global (Internet) Isolated Data Model	<ul style="list-style-type: none"><li>• Internet Scale</li><li>• Highly Controlled Access</li><li>• Worldwide Scope</li></ul>	<ul style="list-style-type: none"><li>• Simplistic but tight Security</li><li>• Synchronization</li><li>• Simple Resource Sked</li></ul>	<ul style="list-style-type: none"><li>• Very Limited Doc Store</li><li>• Public Media Dist'n – Publishing</li><li>• Royalties and Sales</li></ul>
Enterprise (Intranet) Shared Data Model	<ul style="list-style-type: none"><li>• Protected Servers</li><li>• Sophisticated Admin</li><li>• Domains &amp; Boundaries</li></ul>	<ul style="list-style-type: none"><li>• Complex Security</li><li>• Replication</li><li>• Resource Coordination</li></ul>	<ul style="list-style-type: none"><li>• Document Workflow</li><li>• Media Libraries</li><li>• DRM</li></ul>
Workgroup or Family Synchronized Models	<ul style="list-style-type: none"><li>• Peer to Peer</li><li>• Self Managing</li><li>• Shared Contacts</li></ul>	<ul style="list-style-type: none"><li>• Simple Security</li><li>• Synchronization</li><li>• Schedule Mngmnt</li></ul>	<ul style="list-style-type: none"><li>• Shared Documents</li><li>• Shared Songs</li><li>• Shared Pictures</li></ul>
Personal (Local) (Desktop Notebook)	<ul style="list-style-type: none"><li>• Replaces PST</li><li>• Local Identity Service</li></ul>	<ul style="list-style-type: none"><li>• Operate Online</li><li>• Operate Offline</li><li>• Automatic Synchronization</li></ul>	
Appliance	<ul style="list-style-type: none"><li>• Subset of Personal Level</li></ul>	<ul style="list-style-type: none"><li>• Operate Online</li><li>• Operate Offline</li><li>• Automatic Synchronization</li></ul>	

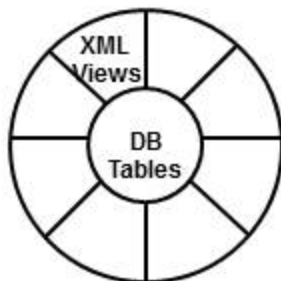
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# One Engine, Four Levels

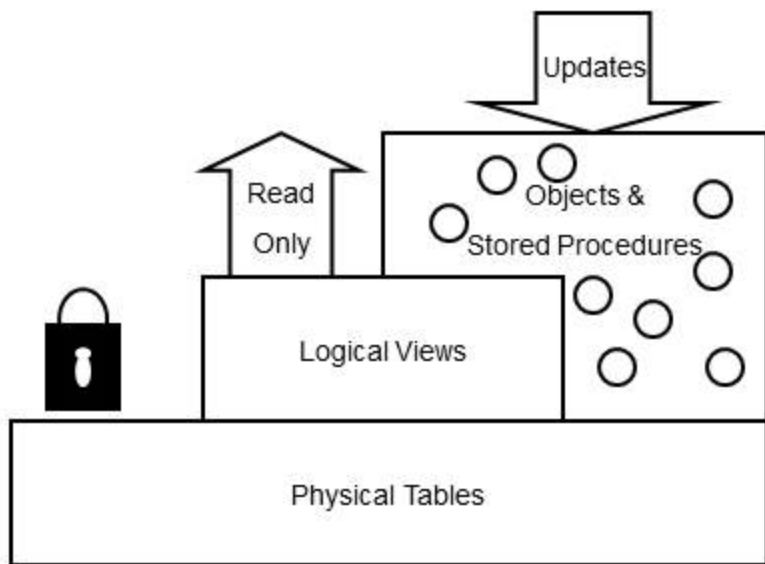


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# One Model: Many Faces



# Direct Table Access? Really?



# Offline, Online, Shared, Hosted



Cloud



Enterprise



Workgroup

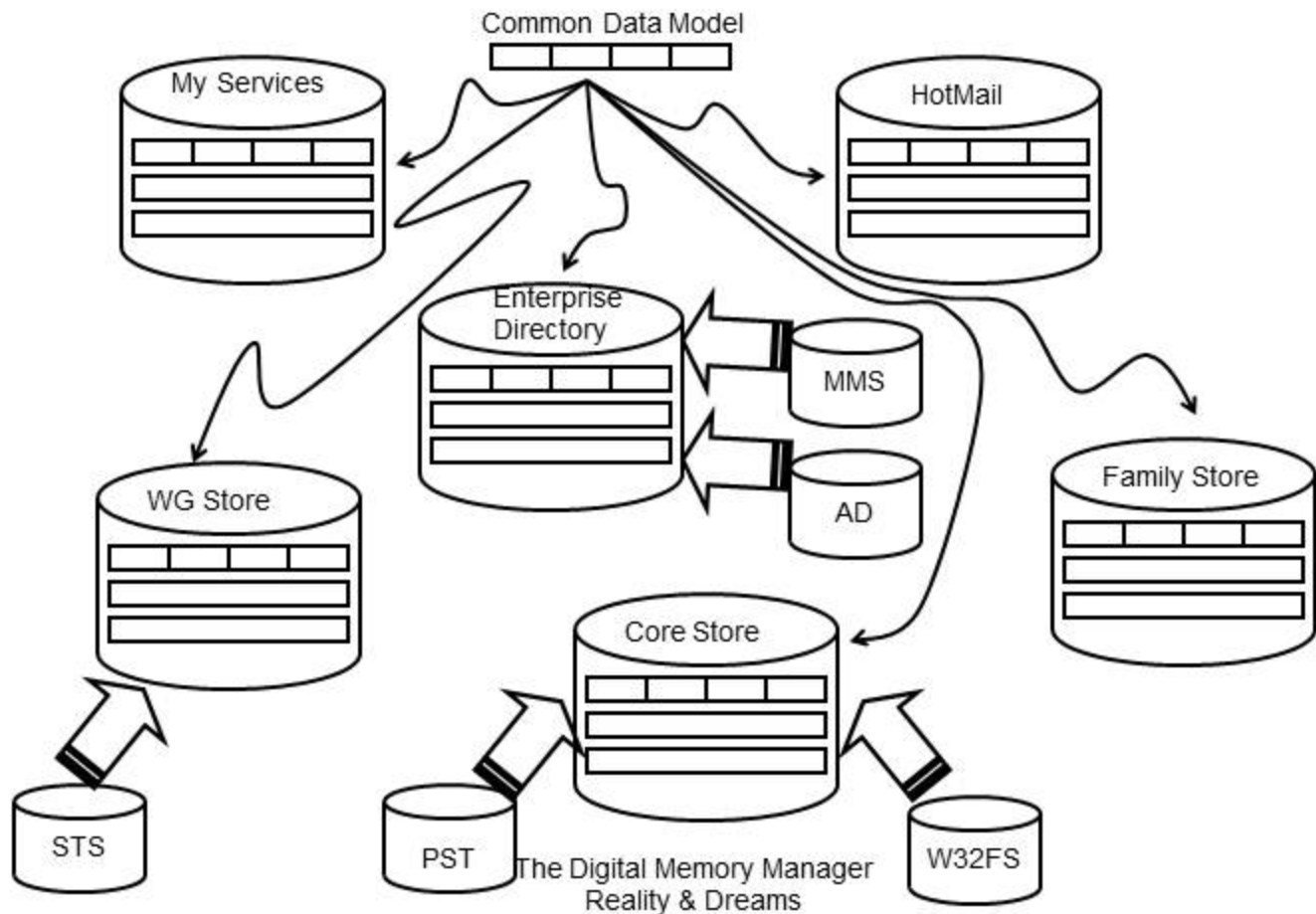


Personal



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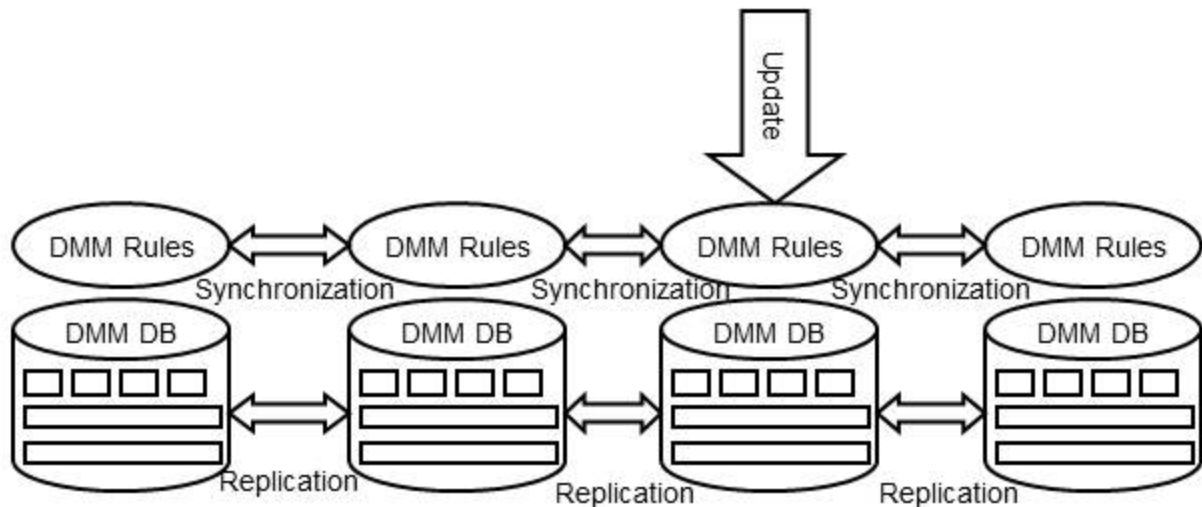
# Common Base Storage & Model





# Where Is The Code?

## Where Are the (Business) Rules?



# Base Storage Architecture

## Digital Memory Manager

### Organization

- Core Schema
- Business IAYF
- Personal Memory
- Core to Apps

### Indexing

- Text Indexing
- Face Recognition
- Cddb?
- Video?

### Security & Rights

- Watermarks
- Encryption
- DRM
- Sharing

### Formats

- Ink
- Scalable Pictures
- Better Sound
- Video
- Documents
- Records

## Base Storage: SQLserver

Extended Relational  
Algebra

Relational File  
System

XML Logical Views

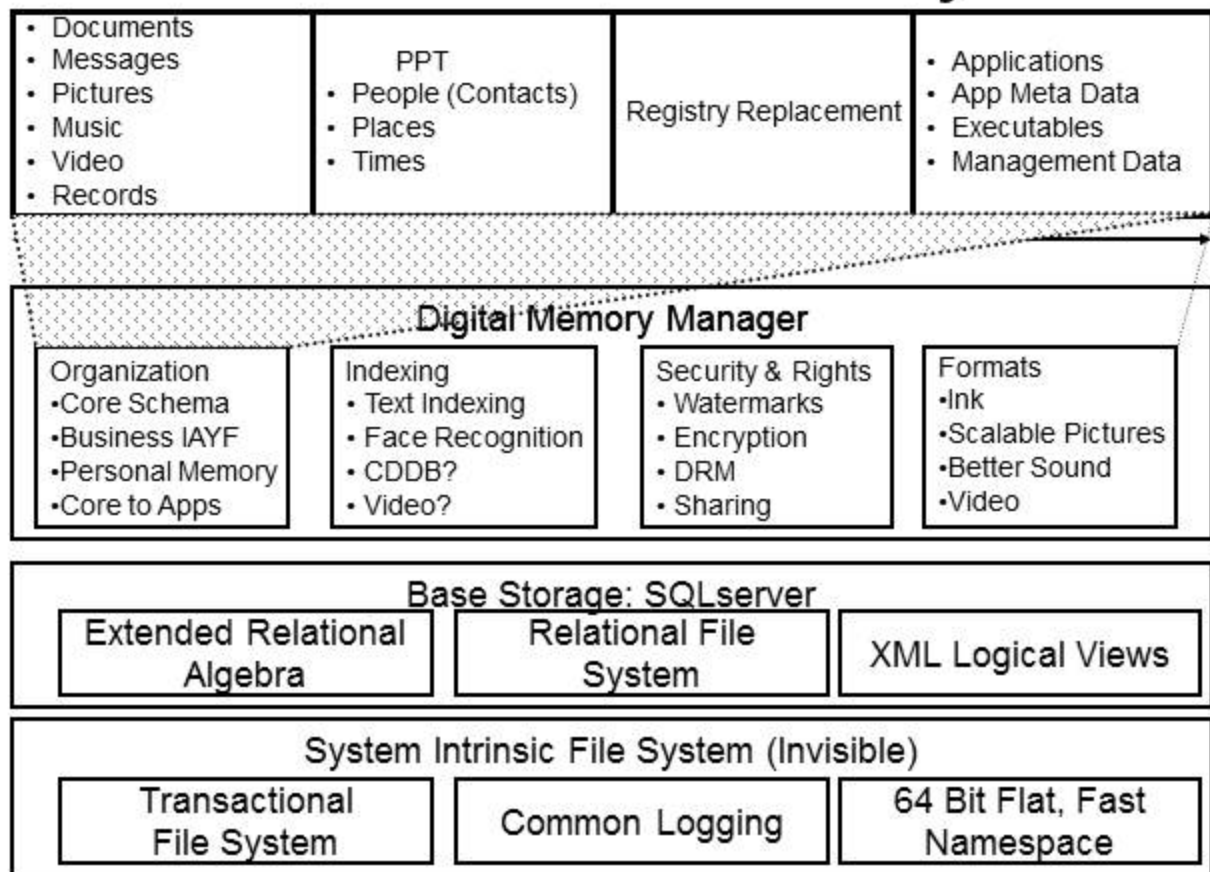
## System Intrinsic File System (Invisible)

Transactional  
File System

Common Logging

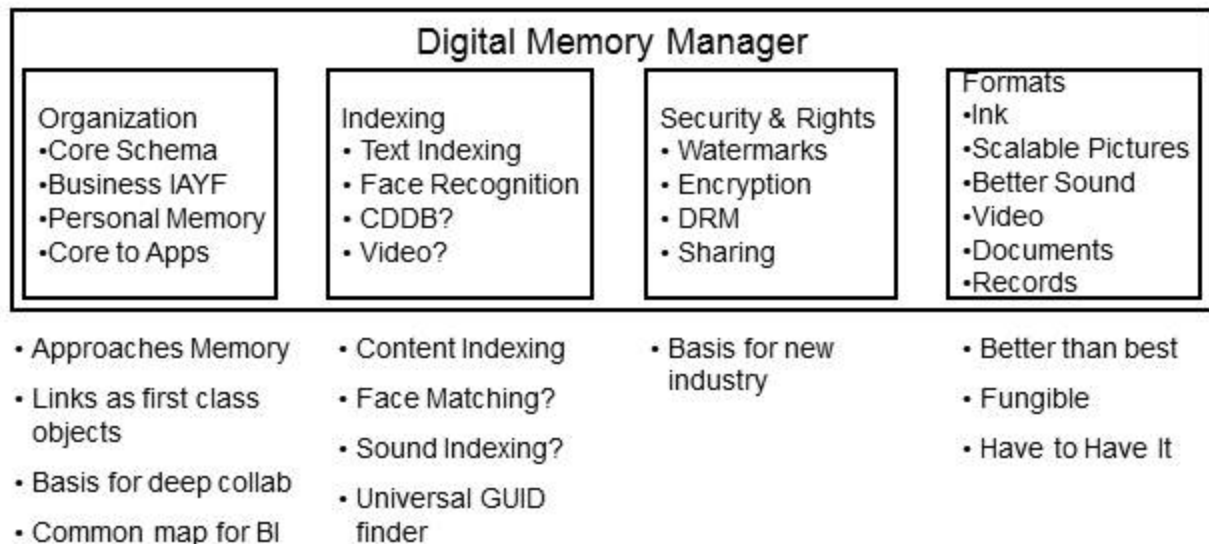
Flat, Fast  
Namespace

# Schema Taxonomy

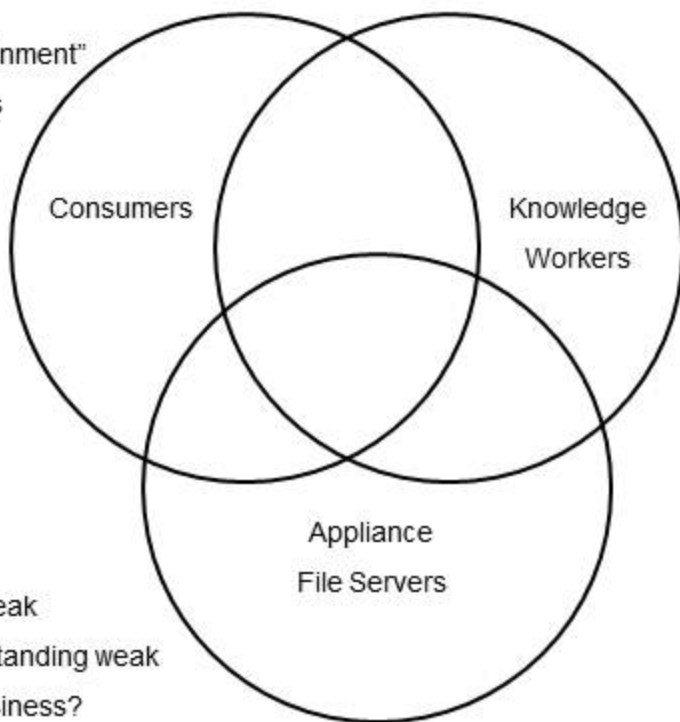


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# The Digital Memory Manager



# Three Constituencies



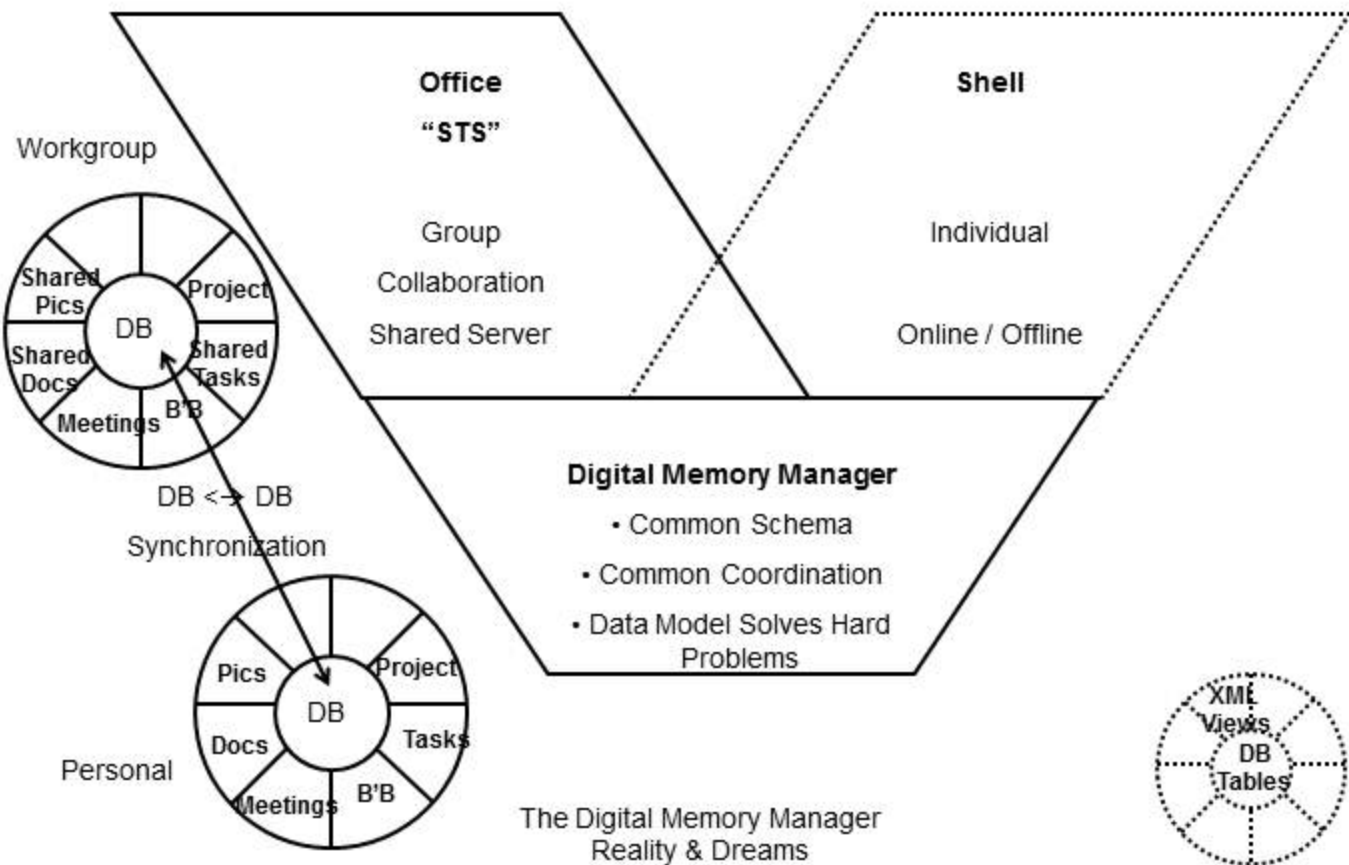
- Shell Users
- Redefine "Entertainment"
- Pictures & Sounds

- Office Users
- Collaboration
  - Shared Workspace in '03
  - Deep Collaboration in '05
- BI – Does Store Play a Role?
- New Datatypes: Does Office play?

- O/S Users
- Strategy still weak
- Market understanding weak
  - Small Business?
  - Hosted or Local?

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# Extending Collaboration Offline



# The Shell Becomes “Visible”

